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(57)Abstract:
PROBLEM TO BE SOLVED: To provide an image processing unit and its method that can enhance motion detection accuracy for IP (Interlace-Progressive) conversion attended with motion correction so as to enhance the image quality of interpolation thereby enhancing the image quality of a converted progressive image by the IP conversion.
SOLUTION: The image processing unit 10 that detects a moving part, generates interpolation data through interpolation pixel arithmetic operations as to a line where data of an interlace scanning video signal do not exist and converts the interlace video signal into a progressive video signal on the basis of the interpolation data, is provided with IP conversion circuits 15R, 15G, 15B that calculate data differences among respective fields on the basis of current field data and field delay data, set a flag to part greater than the threshold value preset on the basis of the respective data differences and use ORed obtained respective flag data for the motion part detection.

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<HR>CLAIMS
<HR>[Claim(s)]

[Claim 1]

Perform motion partial detection, perform a interpolation pixel operation about
Rhine where the data of the video signal of an interlace do not exist, and
interpolation data are created.
It is the image processing system which changes the video signal of an interlace
into the video signal of progressive based on the interpolation data concerned.
It is based on the present field data and two or more field delay data.
the data between each field -- difference -- calculating -- each data -- difference
-- the image processing system which has a processing means to set a flag into a
larger part than the threshold beforehand set up with the value, and to use the OR
of each obtained flag data for the above-mentioned motion partial detection.

[Claim 2]

the above-mentioned processing means -- the data of the even number fields -- the
data of difference and the odd number fields -- the difference of the even number
fields which calculated at least one side, and calculated and asked for it among
difference -- the difference of data and the odd number fields -- the inside of data
-- at least -- on the other hand, the image processing system according to claim 1
used for motion detection.

[Claim 3]

The above-mentioned processing means is an image processing system according to
claim 1 made into the mixing ratio of the still picture and animation at the time of
carrying out the interpolation pixel operation of the total value of the motion
judging flag in two or more pixels which doubled a interpolation pixel and its
perimeter two or more pixels.

[Claim 4]

The above-mentioned processing means is an image processing system according to
claim 1 which makes the value which calculated the sum total by having changed the
rate for the motion judging flag in two or more pixels which doubled a interpolation
pixel and its perimeter two or more pixels by the pixel, and clipped the total value
with the threshold the ratio for mixing the rate of a still picture and an animation
gradually to the target interpolation pixel.

[Claim 5]

The above-mentioned processing means is an image processing system according to
claim 1 which changes the threshold which moves according to the class of signal
source and is used for partial detection.

[Claim 6]

The above-mentioned processing means is an image processing system according to
claim 1 which changes the threshold which performs transform processing from an
interlace to progressive, and which moves for every signal and is used for partial
detection according to the class of signal source.

[Claim 7]

Perform motion partial detection, perform a interpolation pixel operation about
Rhine where the data of the video signal of an interlace do not exist, and
interpolation data are created.
It is the image processing system which changes the video signal of an interlace
into the video signal of progressive based on the interpolation data concerned.
Difference is calculated. the field data with which two or more time intervals are
different -- being based -- the data between each field --
each data -- difference -- the image processing system which has a processing means
to set a flag into a larger part than a threshold with a value, and to use the OR of
each obtained flag data for the above-mentioned motion partial detection.

[Claim 8]

the above-mentioned processing means -- the data of the even number fields -- the data of difference and the odd number fields -- the difference of the even number fields which calculated at least one side, and calculated and asked for it among difference -- the difference of data and the odd number fields -- the inside of data -- at least -- on the other hand, the image processing system according to claim 7 used for motion detection.

[Claim 9]

The above-mentioned processing means is an image processing system according to claim 7 made into the mixing ratio of the still picture and animation at the time of carrying out the interpolation pixel operation of the total value of the motion judging flag in two or more pixels which doubled a interpolation pixel and its perimeter two or more pixels.

[Claim 10]

The above-mentioned processing means is an image processing system according to claim 7 which makes the value which calculated the sum total by having changed the rate for the motion judging flag in two or more pixels which doubled a interpolation pixel and its perimeter two or more pixels by the pixel, and clipped the total value with the threshold the ratio for mixing the rate of a still picture and an animation gradually to the target interpolation pixel.

[Claim 11]

The above-mentioned processing means is an image processing system according to claim 7 which changes the threshold which moves according to the class of signal source and is used for partial detection.

[Claim 12]

The above-mentioned processing means is an image processing system according to claim 7 which changes the threshold which performs transform processing from an interlace to progressive, and which moves for every signal and is used for partial detection according to the class of signal source.

[Claim 13]

Perform motion partial detection, perform a interpolation pixel operation about Rhine where the data of the video signal of an interlace do not exist, and interpolation data are created.
It is the image processing system which changes the video signal of an interlace into the video signal of progressive based on the interpolation data concerned.
It is based on the field data with which the present field data, two or more field delay data, and two or more time intervals are different.
the data between each field -- difference -- calculating -- each data -- difference -- the image processing system which has a processing means to set a flag into a larger part than the threshold beforehand set up with the value, and to use the OR of each obtained flag data for the above-mentioned motion partial detection.

[Claim 14]

the above-mentioned processing means -- the data of the even number fields -- the data of difference and the odd number fields -- the difference of the even number fields which calculated at least one side, and calculated and asked for it among difference -- the difference of data and the odd number fields -- the inside of data -- at least -- on the other hand, the image processing system according to claim 13 used for motion detection.

[Claim 15]

The above-mentioned processing means is an image processing system according to claim 13 made into the mixing ratio of the still picture and animation at the time of carrying out the interpolation pixel operation of the total value of the motion judging flag in two or more pixels which doubled a interpolation pixel and its perimeter two or more pixels.

[Claim 16]

The above-mentioned processing means is an image processing system according to claim 13 which makes the value which calculated the sum total by having changed the rate for the motion judging flag in two or more pixels which doubled a interpolation pixel and its perimeter two or more pixels by the pixel, and clipped the total value with the threshold the ratio for mixing the rate of a still picture and an animation gradually to the target interpolation pixel.

[Claim 17]

The above-mentioned processing means is an image processing system according to claim 13 which changes the threshold which moves according to the class of signal source and is used for partial detection.

[Claim 18]

The above-mentioned processing means is an image processing system according to claim 13 which changes the threshold which performs transform processing from an interlace to progressive, and which moves for every signal and is used for partial detection according to the class of signal source.

[Claim 19]

Perform motion partial detection, perform a interpolation pixel operation about Rhine where the data of the video signal of an interlace do not exist, and interpolation data are created.
It is the image-processing approach of changing the video signal of an interlace into the video signal of progressive based on the interpolation data concerned.
It is based on the present field data and two or more field delay data.
the data between each field -- difference -- calculating -- each data -- difference -- the image-processing approach of setting a flag into a larger part than the threshold beforehand set up with the value, and using the OR of each obtained flag data for the above-mentioned motion partial detection.

[Claim 20]

the data of the even number fields -- the data of difference and the odd number fields -- the difference of the even number fields which calculated at least one side, and calculated and asked for it among difference -- the difference of data and the odd number fields -- the inside of data -- at least -- on the other hand, the image-processing approach according to claim 19 used for motion detection.

[Claim 21]

The image-processing approach according to claim 19 made into the mixing ratio of the still picture and animation at the time of carrying out the interpolation pixel operation of the total value of the motion judging flag in two or more pixels which doubled a interpolation pixel and its perimeter two or more pixels.

[Claim 22]

The image-processing approach according to claim 19 which makes the value which calculated the sum total by having changed the rate for the motion judging flag in two or more pixels which doubled a interpolation pixel and its perimeter two or more pixels by the pixel, and clipped the total value with the threshold the ratio for mixing the rate of a still picture and an animation gradually to the target interpolation pixel.

[Claim 23]

The image-processing approach according to claim 19 of changing the threshold which moves according to the class of signal source and is used for partial detection.

[Claim 24]

The image-processing approach according to claim 19 of changing the threshold which performs transform processing from an interlace to progressive and which moves for every signal and is used for partial detection according to the class of signal source.

[Claim 25]

Perform motion partial detection, perform a interpolation pixel operation about Rhine where the data of the video signal of an interlace do not exist, and interpolation data are created.
It is the image-processing approach of changing the video signal of an interlace into the video signal of progressive based on the interpolation data concerned.
the field data with which two or more time intervals are different -- being based -- the data between each field -- difference -- calculating -- each data -- difference -- the image-processing approach of setting a flag into a larger part than a threshold with a value, and using the OR of each obtained flag data for the above-mentioned motion partial detection.

[Claim 26]

the data of the even number fields -- the data of difference and the odd number fields -- the difference of the even number fields which calculated at least one side, and calculated and asked for it among difference -- the difference of data and the odd number fields -- the inside of data -- at least -- on the other hand, the image-processing approach according to claim 25 used for motion detection.

[Claim 27]

The image-processing approach according to claim 25 made into the mixing ratio of the still picture and animation at the time of carrying out the interpolation pixel operation of the total value of the motion judging flag in two or more pixels which doubled a interpolation pixel and its perimeter two or more pixels.

[Claim 28]

The image-processing approach according to claim 25 which makes the value which calculated the sum total by having changed the rate for the motion judging flag in two or more pixels which doubled a interpolation pixel and its perimeter two or more pixels by the pixel, and clipped the total value with the threshold the ratio for mixing the rate of a still picture and an animation gradually to the target interpolation pixel.

[Claim 29]

The image-processing approach according to claim 25 of changing the threshold which moves according to the class of signal source and is used for partial detection.

[Claim 30]

The above-mentioned processing means is the image-processing approach according to claim 25 of changing the threshold which performs transform processing from an interlace to progressive and which moves for every signal and is used for partial detection according to the class of signal source.

[Claim 31]

Perform motion partial detection, perform a interpolation pixel operation about Rhine where the data of the video signal of an interlace do not exist, and interpolation data are created.
It is the image-processing approach of changing the video signal of an interlace into the video signal of progressive based on the interpolation data concerned.
It is based on the field data with which the present field data, two or more field delay data, and two or more time intervals are different.
the data between each field -- difference -- calculating -- each data -- difference -- the image-processing approach of setting a flag into a larger part than the threshold beforehand set up with the value, and using the OR of each obtained flag data for the above-mentioned motion partial detection.

[Claim 32]

the data of the even number fields -- the data of difference and the odd number fields -- the difference of the even number fields which calculated at least one side, and calculated and asked for it among difference -- the difference of data and the odd number fields -- the inside of data -- at least -- on the other hand, the image-processing approach according to claim 31 used for motion detection.

[Claim 33]

Page 6

The image-processing approach according to claim 31 made into the mixing ratio of the still picture and animation at the time of carrying out the interpolation pixel operation of the total value of the motion judging flag in two or more pixels which doubled a interpolation pixel and its perimeter two or more pixels.

[Claim 34]

The image-processing approach according to claim 31 which makes the value which calculated the sum total by having changed the rate for the motion judging flag in two or more pixels which doubled a interpolation pixel and its perimeter two or more pixels by the pixel, and clipped the total value with the threshold the ratio for mixing the rate of a still picture and an animation gradually to the target interpolation pixel.

[Claim 35]

The image-processing approach according to claim 31 of changing the threshold which moves according to the class of signal source and is used for partial detection.

[Claim 36]

The image-processing approach according to claim 31 of changing the threshold which performs transform processing from an interlace to progressive and which moves for every signal and is used for partial detection according to the class of signal source.

<HR>DETAILED DESCRIPTION
<HR>[Detailed Description of the Invention]

[0001]

[Field of the Invention]

This invention relates to an image processing system, and relates to the image processing system which changes an interlace signal into a progressive signal especially (IP conversion), and its approach.

[0002]

[Description of the Prior Art]

<<interlace signal>> In the present color-television signal system, although an NTSC (National Television System Committee) method, a PAL (Phase Alternation by Line) method, etc. exist, these serve as a signal system characterized by interlace scanning.
Interlace scanning is a method which jumps over and scans the one scanning line at a time, as it is also called interlaced scanning and is shown in
<A HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipdl.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000016" TARGET="tjitemdrw">drawing 14</A>

Since the 525 scanning lines are expressing the image of one sheet in the case of an NTSC signal, this will have been decomposed into 262.5 lines for interlace scanning. When performing a scan once, having returned and scanning because the fraction of 0.5 of decimal point follows here, the returning location will shift [only 0.5]. Gap will arise by this in [the picture element by which a scan is performed to the 1st time, and the picture element scanned by the 2nd time] location, and it will project as 525 lines by uniting these.
525 images transmitted by the field, the call, and two vertical scannings in the image which consists of the 262.5 scanning lines at this time are called a frame.
In
<A HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipdl.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000016"

TARGET="tjitemdrw">drawing 14</A>
, the arrow of a continuous line shows the scanning line of the 1st field, and the arrow of a dotted line shows the scanning line of the 2nd field.

[0003]

The field which consists of these 262.5 consists of the 60 fields in 1 second, and NTSC system is displayed as an animation.
Moreover, similarly, there are the 312.5 scanning lines of the 1 field and, in the case of a PAL system, they are expressing the image of a frame by 625 2 field
****
As for the field signal with which such character differs, the odd number field (od field) and the even-numbered field are called the even number field (even field) for the odd-numbered field.

[0004]

<< -- progressive-ized>> -- to an interlace signal, as shown in
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%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000017"
TARGET="tjitemdrw">drawing 15</A>
, the thing of the scan which it performs one [at a time], without performing interlaced scanning is called sequential scanning or non-interlaced scan.
Again.
This signal is also called a non-interlaced signal or a progressive signal to an interlace signal.
Since the interlace signal used by the television broadcasting method etc. from the first is a signal currently devised so that the band to transmit may be stopped and a flicker (flicker) may not be caused, for high-definition-izing, its progressive signal is more desirable.
Moreover, although large-sized television etc. is increasing in number comparatively recently, if an interlace signal is displayed on a large-sized display, spacing of the scanning line was conspicuous and it has led to image quality degradation.
Therefore, in these television, changing an interlace signal into a progressive signal by the internal image processing is often performed recently.
It is called IP (Interlace-Progressive) conversion to change this interlace signal into a progressive signal.

[0005]

moreover -- as the method with which liquid crystal and the display which puts in order and constitutes PDP (Plasma Display Panel) and LED (Light Emitting Diode) also drive a display device in addition to the above reasons not only as television of the Braun tube but as a graphic display device -- a progressive signal -- a driver component -- the need -- there is a case and the need of performing IP conversion has arisen.
Fundamentally, the activity of progressive-izing is equivalent to newly making scanning-line data from the information acquired by the interlace signal.
It is the reason than to which image quality is also greatly influenced and greater importance is attached to IP conversion technique with this newly made scanning-line data.

[0006]

The latest technical trend>> in <<IP conversion Various things exist also in the technique of IP conversion.
High definition-ization of television is aimed at and development has been furthered in each company especially recently.
It is roughly as a method divided into two, direct conversion and linear interpolation, also in it.
A direct conversion method is a method which makes immediate data, while mapping refers the database corresponding to the data pattern of an input.
Generally another linear interpolation method detects the existence of a motion of an image and a body, and animations are the interpolation in the field, and a method which changes a still picture accommodative as inter-frame interpolation.

The method called such motion amendment mold IP conversion as a general IP conversion method in the present condition is almost the case.
The following explanation describes this motion amendment mold interpolation method (linear interpolation method).

[0007]

Motion amendment technical>> of <<present condition The flow of IP transform processing of a linear interpolation method is divided roughly, and has (a "creation of the interpolation data for still pictures"), (b) "creation of the interpolation data for animations", (c) "a motion judging", and (d) "the decision of the interpolation data based on a motion judging."

[0008]

Creation of the interpolation data for still pictures of (a) is made like the example shown in
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%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000018"
TARGET="tjitemdrw">drawing 16</A>
using the field data with which a front and the back continued to the pixel data of the target interpolation scanning line.
When using an average value in order, front data may be used for this as it is.
If it is a still picture at this time, since the image of one sheet was interlace-ized from the first (two division) and it divides into the field of two sheets, interpolation with the most sufficient resolution can be performed.

[0009]

Creation of the interpolation data for animations of (b) is created from the data in the field with the scanning line to interpolate, as shown in
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000003"
TARGET="tjitemdrw">drawing 17</A>

It can interpolate by taking the average of up-and-down Rhine simply.
Since it may be data which will completely be unrelated in the field of order at this time if it is an animation, the failure is visible to a duplex when it interpolates, as shown in (a), or an edge looks jaggedly is encountered. [of an image]
Therefore, if it is an animation, image quality degradation has little way which interpolates by the data in the field.

[0010]

It is the part which judges in 1 screen whether it is being stood still whether the image is actually running by the motion judging of (c) for every pixel.
Although various technique exists in the detection approach, the difference of the brightness is most fundamentally considered to be the magnitude of a motion using the field of two sheets, and if larger than a fixed threshold with difference, it will judge with an animation.

[0011]

Final interpolation data are outputted by the decision of the interpolation data based on the motion judging of (d).
It is also considered that this makes a judgment whether the data for which it asked by (a), or the data for which it asked by (b) is used as interpolation data, and outputs the average of (a) and (b) as the in-between data by the motion judging of (c) depending on the case.

[0012]

[Problem(s) to be Solved by the Invention]

Fundamentally, motion amendment mold IP conversion is the technique which was going to change locally the good part of the image quality by inter-frame processing, and the good part of the image quality by the processing in the field, and was going to use the good part of both image quality.
So, the technique of choosing an art so that proper interpolation processing can be performed in the partial part of image quality becomes important.
However, by the conventional motion amendment mold IP conversion approach, there is a possibility of mistaking the part to choose, consequently there is disadvantageous profit of degrading image quality.

[0013]

If it interpolates using the data of the field which has time difference like processing for still pictures in the part which is moving, specifically, image quality degradation of looking jaggedly with the edge of the part which is moving will occur.
Moreover, in a stationary part, when it interpolates only using the data in the field like processing for animations, there is a problem of becoming the image quality in which resolution fell and faded rather than the image quality acquired by the processing for still pictures.

[0014]

Moreover, when it only changes to the image part which performed interpolation for still pictures, and the image part which performed interpolation for animations and a interpolation image is created, the difference in resolution is conspicuous in the changed part.
In the case where it changes in a specific part for every field especially, there is a problem to which it seems that there is CHIRATSUKI in the part.

[0015]

This invention is made in view of this situation, as for the purpose, can raise the motion detection precision of IP conversion accompanied by motion amendment, can improve interpolation image quality, and is to offer the image processing system which can raise the image quality of the progressive image changed by IP conversion, and its approach.

[0016]

[Means for Solving the Problem]

In order to attain the above-mentioned purpose, this invention performs motion partial detection, performs a interpolation pixel operation about Rhine where the data of the video signal of an interlace do not exist, and creates interpolation data.
It is the image processing system which changes the video signal of an interlace into the video signal of progressive based on the interpolation data concerned.
It is based on the present field data and two or more field delay data.
the data between each field -- difference -- calculating -- each data -- difference -- it has a processing means to set a flag into a larger part than the threshold beforehand set up with the value, and to use the OR of each obtained flag data for the above-mentioned motion partial detection.

[0017]

Moreover, this invention performs motion partial detection, performs a interpolation pixel operation about Rhine where the data of the video signal of an interlace do not exist, and creates interpolation data.
It is the image processing system which changes the video signal of an interlace into the video signal of progressive based on the interpolation data concerned.
the field data with which two or more time intervals are different -- being based -- the data between each field -- difference -- calculating -- each data -- difference -- it has a processing means to set a flag into a larger part than a threshold with a value, and to use the OR of each obtained flag data for the above-mentioned motion partial detection.

[0018]

Moreover, perform motion partial detection, perform a interpolation pixel operation about Rhine where the data of the video signal of an interlace do not exist, and interpolation data are created.
It is the image processing system which changes the video signal of an interlace into the video signal of progressive based on the interpolation data concerned.
It is based on the field data with which the present field data, two or more field delay data, and two or more time intervals are different.
the data between each field -- difference -- calculating -- each data -- difference -- it has a processing means to set a flag into a larger part than the threshold beforehand set up with the value, and to use the OR of each obtained flag data for the above-mentioned motion partial detection.

[0019]

moreover -- this invention equipment -- the above-mentioned processing means -- the data of the even number fields -- the data of difference and the odd number fields -- the difference of the even number fields which calculated at least one side, and calculated and asked for it among difference -- the difference of data and the odd number fields -- the inside of data -- at least -- on the other hand, it uses for motion detection.

[0020]

Moreover, let the above-mentioned processing means be the mixing ratio of the still picture and animation at the time of carrying out the interpolation pixel operation of the total value of the motion judging flag in two or more pixels which doubled a interpolation pixel and its perimeter two or more pixels with this invention equipment.

[0021]

Moreover, with this invention equipment, the above-mentioned processing means calculates the sum total by changing a rate for the motion judging flag in two or more pixels which doubled a interpolation pixel and its perimeter two or more pixels by the pixel, and makes the value which clipped the total value with the threshold the ratio for mixing the rate of a still picture and an animation gradually to the target interpolation pixel.

[0022]

Moreover, with this invention equipment, the above-mentioned processing means changes the threshold which moves according to the class of signal source and is used for partial detection.

[0023]

Moreover, with this invention equipment, the above-mentioned processing means changes the threshold which performs transform processing from an interlace to progressive and which moves for every signal and is used for partial detection according to the class of signal source.

[0024]

Moreover, this invention performs motion partial detection, performs a interpolation pixel operation about Rhine where the data of the video signal of an interlace do not exist, and creates interpolation data.
It is the image-processing approach of changing the video signal of an interlace into the video signal of progressive based on the interpolation data concerned.
It is based on the present field data and two or more field delay data.
the data between each field -- difference -- calculating -- each data -- difference -- a flag is set into a larger part than the threshold beforehand set up with the value, and the OR of each obtained flag data is used for the above-mentioned motion partial detection.

[0025]

Moreover, this invention performs motion partial detection, performs a interpolation pixel operation about Rhine where the data of the video signal of an interlace do not exist, and creates interpolation data.

It is the image-processing approach of changing the video signal of an interlace into the video signal of progressive based on the interpolation data concerned. the field data with which two or more time intervals are different -- being based -- the data between each field -- difference -- calculating -- each data -- difference -- a flag is set into a larger part than a threshold with a value, and the OR of each obtained flag data is used for the above-mentioned motion partial detection.

[0026]

Moreover, this invention performs motion partial detection, performs a interpolation pixel operation about Rhine where the data of the video signal of an interlace do not exist, and creates interpolation data.
It is the image-processing approach of changing the video signal of an interlace into the video signal of progressive based on the interpolation data concerned.
It is based on the field data with which the present field data, two or more field delay data, and two or more time intervals are different.
the data between each field -- difference -- calculating -- each data -- difference -- a flag is set into a larger part than the threshold beforehand set up with the value, and the OR of each obtained flag data is used for the above-mentioned motion partial detection.

[0027]

moreover -- this invention approach -- the data of the even number fields -- the data of difference and the odd number fields -- the difference of the even number fields which calculated at least one side, and calculated and asked for it among difference -- the difference of data and the odd number fields -- the inside of data -- at least -- on the other hand, it uses for motion detection.

[0028]

Moreover, by this invention approach, it considers as the mixing ratio of the still picture and animation at the time of carrying out the interpolation pixel operation of the total value of the motion judging flag in two or more pixels which doubled a interpolation pixel and its perimeter two or more pixels.

[0029]

Moreover, by this invention approach, the sum total is calculated by changing a rate for the motion judging flag in two or more pixels which doubled a interpolation pixel and its perimeter two or more pixels by the pixel, and let the value which clipped the total value with the threshold be a ratio for mixing the rate of a still picture and an animation gradually to the target interpolation pixel.

[0030]

Moreover, by this invention approach, the threshold which moves according to the class of signal source and is used for partial detection is changed.

[0031]

Moreover, by this invention approach, the threshold which performs transform processing from an interlace to progressive and which moves for every signal and is used for partial detection is changed according to the class of signal source.

[0032]

according to this invention -- two or more field data -- using -- two or more difference -- data (difference component) are used, it is amended in the form where they compensate a detection mistake mutually, and the data of a motion are obtained. Thereby, motion detection with a sufficient precision with few mistakes is realized. Although sensibility can be raised by lowering the threshold of motion detection simply and the mistake of motion detection can naturally be lessened about motion detection therefore, the failure by the noise will also increase.
However, without lowering a threshold in this case, a motion can be more correctly detected by using two or more motion detection data, and the effectiveness of the improvement in sensibility is acquired.
moreover, the field where a time interval is different in performing motion partial detection -- difference -- two or more data are used.
The detection mistake produced according to the problem that it is undetectable

Page 12

since the motion is too late conversely, the problem on which a motion is too quick
to detect a motion, and etc. is compensated thereby especially only by each
inter-frame difference.

[0033]

Moreover, the difference of not only the difference of the even number fields but
the odd number fields is taken, for example.
It moves in the thereby still finer range, and detection is possible.
Since Rhine in the odd number field comes to the middle location of Rhine in the
even number field, and Rhine, the motion detection component also turns into a
component between Rhine of the even number field, and this leads to improvement in
the motion ability to detect in the fine range.

[0034]

Moreover, perimeter plurality, for example, the pixel which is moving by plurality,
i.e., the range of nine points, including 8 pixels, is looked for to the pixel to
interpolate.
It changes to a cine mode from still picture mode with the number of the pixels, and
change of the resolution in a change part stops being able to be conspicuous easily.
Moreover, the sum total is calculated by changing a rate by the pixel in the motion
judging flag in two or more pixels which doubled a interpolation pixel and its
perimeter two or more pixels, and the ratio of [for the value which clipped the
total value with the threshold to mix the rate of a still picture and an animation
gradually to the target interpolation pixel] is carried out.
When asking for the sum of the motion detection flag in nine points, specifically,
the sum of nine points can set only Rhine near the pixel to interpolate a maximum of
to 12 not by 1 but by doubling two, for example, and adding 2, namely, carrying out
weighting of target Rhine.
A perfect cine mode and a mean value can make it easy to become a cine mode from a
mix simple by taking ** full quiescence mode and the value of a still picture and an
animation by which it is mixed on a linearity phase target by clipping this sum by
8, if it is zero, and it becomes eight.
This has few breakdowns of an image when the way which processed by judging a still
picture as an animation sees rather than judging an animation to be a still picture
and processing it in the case of incorrect detection, and has the effectiveness
which cannot cause easily the decision mistake in which it is easy to be conspicuous
in image quality.

[0035]

[Embodiment of the Invention]

<A
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l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000003"
TARGET="tjitemdrw">Drawing 1</A>
is the block diagram showing 1 operation gestalt of the image processing system
concerning this invention.

[0036]

The image processing system 10 concerning this operation gestalt has the Y/C
separation circuit 11, the chroma decoder 12, the analogue-to-digital (A/D)
conversion circuits 13R, 13G, and 13B, the field memory groups 14R, 14G, and 14B,
the IP conversion circuits 15R, 15G, and 15B, and the digital analog (D/A)
conversion circuits 16R, 16G, and 16B, as shown in
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000003"
TARGET="tjitemdrw">drawing 1</A>

In addition, a processing means is constituted by the field memory groups 14R, 14G,
and 14B and the IP conversion circuits 15R, 15G, and 15B among these components.

In addition, in this image processing system 10, the case of composite video, the component of Y/R-Y/B-Y, and the interlace signal of RGB is assumed about the input signal.

[0037]

In response to the composite video signal inputted, it separates into a luminance signal Y and the chroma signal C, and the Y/C separation circuit 11 is outputted to the chroma decoder 12.

[0038]

Based on the luminance signal Y by the Y/C separation circuit 11, and the chroma signal C, the chroma decoder 12 is changed into each signal of R (red; red), G (green; Green), and B (blue; blue) which are the three primary colors of a color, outputs the red signal R to A/D-conversion circuit 13R, outputs the Green signal G to A/D-conversion circuit 13G, and outputs the blue signal B to A/D-conversion circuit 13B.

[0039]

A/D-conversion circuit 13R changes the chroma decoder 12 or the red signal R of the analog signal from the outside into a digital signal, and outputs it to field memory group 14R and IP conversion circuit 15R.

[0040]

A/D-conversion circuit 13G change into a digital signal the Green signal G which is the chroma decoder 12 or an analog signal from the outside, and output it to field memory group 14G and IP conversion circuit 15G.

[0041]

A/D-conversion circuit 13B changes into a digital signal the blue signal B which is the chroma decoder 12 or an analog signal from the outside, and outputs it to field memory group 14B and IP conversion circuit 15B.

[0042]

Cascade connection of six field memory 14R-1-14R-6 is carried out to the input line of digital signal R to which field memory group 14R is outputted from A/D-conversion circuit 13R.
Acquire the signal of 1 field delay by field memory 14R-1, and the signal of 2 field delay is acquired by field memory 14R-2.
Acquire the signal of 3 field delay by field memory 14R-3, and the signal of 6 field delay is acquired by field memory 14R-6.
The signal of these 1 field delay, 2 field delay, 3 field delay, and 6 field delay is supplied to IP conversion circuit 15R.

[0043]

Cascade connection of six field memory 14G-1-14G-6 is carried out to the input line of digital signal R to which field memory group 14G are outputted from A/D-conversion circuit 13G.
Acquire the signal of 1 field delay by field memory 14G-1, and the signal of 2 field delay is acquired by field memory 14G-2.
Acquire the signal of 3 field delay by field memory 14G-3, and the signal of 6 field delay is acquired by field memory 14G-6.
The signal of these 1 field delay, 2 field delay, 3 field delay, and 6 field delay is supplied to IP conversion circuit 15G.

[0044]

Cascade connection of six field memory 14B-1-14B-6 is carried out to the input line of digital signal R to which field memory group 14B is outputted from A/D-conversion circuit 13B.
Acquire the signal of 1 field delay by field memory 14B-1, and the signal of 2 field delay is acquired by field memory 14B-2.
Acquire the signal of 3 field delay by field memory 14B-3, and the signal of 6 field delay is acquired by field memory 14B-6.
The signal of these 1 field delay, 2 field delay, 3 field delay, and 6 field delay

is supplied to IP conversion circuit 15B.

[0045]

IP conversion circuit 15R so that it may explain in full detail later fundamentally
The present field signal by which a direct input is carried out from A/D-conversion
circuit 13R, and 1 field delay supplied from field memory group 13R,
The data for the all 5 fields of 2 field delay, 3 field delay, and 6 field delay are
used.
A flag is set into a larger part than a threshold with a value. the data between
each field -- difference -- calculating -- each data -- difference --
It moves and the OR of each obtained flag data is used for partial detection, and
based on this detection result, the inputted interlace signal is changed into a
progressive signal, and it outputs to D/A conversion circuit 16R.

[0046]

IP conversion circuit 15G so that it may explain in full detail later fundamentally
The present field signal by which a direct input is carried out from A/D-conversion
circuit 13G, and 1 field delay supplied from field memory group 13G,
The data for the all 5 fields of 2 field delay, 3 field delay, and 6 field delay are
used.
A flag is set into a larger part than a threshold with a value. the data between
each field -- difference -- calculating -- each data -- difference --
It moves and the OR of each obtained flag data is used for partial detection, and
based on this detection result, the inputted interlace signal is changed into a
progressive signal, and it outputs to D/A conversion circuit 16G.

[0047]

IP conversion circuit 15B so that it may explain in full detail later fundamentally
The present field signal by which a direct input is carried out from A/D-conversion
circuit 13B, and 1 field delay supplied from field memory group 13B,
The data for the all 5 fields of 2 field delay, 3 field delay, and 6 field delay are
used.
A flag is set into a larger part than a threshold with a value. the data between
each field -- difference -- calculating -- each data -- difference --
It moves and the OR of each obtained flag data is used for partial detection, and
based on this detection result, the inputted interlace signal is changed into a
progressive signal, and it outputs to D/A conversion circuit 16B.

[0048]

D/A conversion circuit 16R changes and outputs the digital-progressive signal R
outputted from IP conversion circuit 15R to an analog signal.

[0049]

D/A conversion circuit 16G change and output the digital-progressive signal G
outputted from IP conversion circuit 15G to an analog signal.

[0050]

D/A conversion circuit 16B changes and outputs the digital-progressive signal B
outputted from IP conversion circuit 15B to an analog signal.

[0051]

Below, about concrete processing of IP conversion circuit concerning this invention,
it relates with a drawing and order is explained later on at a detail.

[0052]

Here, as mentioned above, an interlace signal is in the condition decoded by RGB
from the composite signal or the color-difference signal, and it assumes changing
each color into the RGB code of progressive.
Therefore, the same operation procedure is taken in RGB each IP conversion circuits
15R, 15G, and 15B of both corresponding to a color.
Therefore, by the following explanation, ** which describes only the operation of 1
classification by color will perform the same operation by three colors in fact.
Moreover, although the digital signal is considered, especially the bit width of

face of a signal is not specified (it can respond also by the 8-bit signal or the 10-bit signal).

[0053]

First, the data of the interlace signal needed by this processing are explained.
Generally, data are held in memory for field interpolation, and the signal of 1 field delay or 2 field delay is needed.
However, in this operation gestalt, as shown in
<A
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l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000004"
TARGET="tjitemdrw">drawing 2</A>
, the data for the 5 fields are needed by all of the present field signal inputted,
1 field delay and 2 field delay, 3 field delay, and 6 field delay.

[0054]

(A) Carry forward the interpolation data for still pictures in the procedure of creation, (C) motion detection, and creation of the (D) output data for the interpolation data for creation and the (B) animations.
Processing of (A) - (D) is explained to below later on in order.
In addition, they are
<A
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l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000005"
TARGET="tjitemdrw">drawing 3</A>
and the flow chart which shows the procedure of the interpolation pixel creation including processing of (A) - (D), and progressive-izing.

[0055]

(A) the interpolation data for still pictures -- creation (steps ST2 and ST3 of
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000005"
TARGET="tjitemdrw">drawing 3</A>
) -- ask for the interpolation data for still pictures first.
In this case, since it is a still picture, and the pixel which is in the homotopic of the field (the fields with the time difference of the 2 field) of order to the field with the pixel which should interpolate the purpose has the same data, when the data of the pixel which should be carried out direct interpolation are theoretically chosen from the data of homotopic before and behind these fields, resolution should become good most (refer to
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000019"
TARGET="tjitemdrw">drawing 17</A>
).
However, in the field of order, the difference may have arisen by leak (for example, excessive carrier component which was not able to be negated when decoding to RGB in the chroma decoder 12) and the noise component of the subcarrier at the time of a composite signal.
Therefore, let the average value of data be interpolation data for still pictures from the field of correspond order in this operation gestalt at the pixel of Rhine which should be interpolated.

[0056]

<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000006"

TARGET="tjitemdrw">Drawing 4</A>
is drawing for explaining the data used when creating the interpolation data for
still pictures.
In
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000006"
TARGET="tjitemdrw">drawing 4</A>
, interpolation data are written as Sub_Data.
Moreover, in
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000006"
TARGET="tjitemdrw">drawing 4</A>
, the present field sets [each data component] Fld1 and 2 field delay to Fld2 for
Fld0 and 1 field delay, and it is 0Ldly about each criteria Rhine. It carries out
and they are [delay / one line] 3Ldl(ies) about 2Ldl(ies) and three-line delay in
1Ldly and two-line delay. It carries out and is displaying in the format which
connected field delay and the Rhine delay by the underbar.
(And each notation, for example, Fld2 2Ldly, The data of a level picture element
part are located in a line with inside.)

[0057]

In order to use the average value of data as the interpolation data for still
pictures from the field of correspond order at the pixel of Rhine which should be
interpolated
That is, as shown in drawing, the pixel (each pixel located in Rhine of Sub_Data of
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000006"
TARGET="tjitemdrw">drawing 4</A>
) of Rhine which should be interpolated is received.
The pixel of Rhine equivalent to the interpolation location of the front field
The sum is taken by the pixels equivalent to the pixel which should be interpolated
from the scanning-line data of (each pixel located in Rhine of Fld0_1Ldly of
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
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%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000006"
TARGET="tjitemdrw">drawing 4</A>
), and the pixel (each pixel located in Rhine of Fld2_1Ldly of
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
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%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000006"
TARGET="tjitemdrw">drawing 4</A>
) equivalent to the interpolation location of the next field.
Let the value divided by 2 be data of a interpolation pixel.
It is that to which interpolation processing of Rhine which should be interpolated
especially was carried out for still pictures here Sub_Data_Stl It is as follows if
expressed.

[0058]

[Equation 1]

Sub_Data_Stl = (Fld0_1Ldly+Fld2_1Ldly) / 2[0059]

Although the notation in this formula shows the location of Rhine, it is equivalent
to each pixel operation in Rhine.
Moreover, this operation is performed in all Rhine that should be interpolated.

[0060]

(B) The interpolation data for animations also ask for the interpolation data for animations apart from the interpolation data for creation (steps ST4 and ST5 of
<A
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l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000005"
TARGET="tjitemdrw">drawing 3</A>
) still pictures.
In this case, since it is an animation, if the pixel data located in the pixel which should be interpolated from the field of order etc. are used, since unrelated data will be used, it will lead to image quality degradation.
Therefore, it interpolates using data from the inside of the field with the pixel which should be interpolated.
In the case of this operation gestalt, the data of the homotopic of each upper and lower sides of every two lines are used to the pixel in Rhine to interpolate.
Originally, if progressive-ization of a video signal is seen in signal processing only by the time amount in the field, it can be interpreted as the frequency which a sampling line can increase in number and express doubling.
However, a imaging component will be contained in the frequency domain which touched since the frequency component which it has from the first did not change.
In order to remove this image component, the actuation over which a low pass filter is covered is equivalent to the interpolation operation itself.
By performing this operation by the upper and lower sides of four lines in all to interpolation Rhine, good interpolation of frequency characteristics can be performed from the method which takes the average of two lines which was being performed conventionally.

[0061]

That is, in this operation gestalt, the interpolation pixel for animations is obtained by the filtering operation of four taps.
Although various numeric values can be taken, since it is a low pass filter fundamentally, the multiplier of these four taps is a sinc function (sin (x) what multiplied / (x) by the windowing function is used as a multiplier.).
In addition, Cubic which is the approximation function of a sinc function A function etc. can be used.

[0062]

<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000008"
TARGET="tjitemdrw">Drawing 6</A>
and
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000009"
TARGET="tjitemdrw">drawing 7</A>
are Cubic. It is drawing for explaining the example in the case of interpolating functionally.
Cubic A function is a function as shown in
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000008"
TARGET="tjitemdrw">drawing 6</A>
, and interpolation data are created by the convolution operation of this function and data (four points which are in the location of Fld1_0Ldly, Fld1_1Ldly, Fld1_2Ldly, and Fld1_3Ldly in this case).
If a interpolation function is expressed with h (x) like
<A

HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000009"
TARGET="tjitemdrw">drawing 7</A>
at this time, a filter factor will be set to h (-1.5), h (-0.5), h (0.5), and h
(1.5) from the relation of the location to interpolate.
therefore, a interpolation operation -- these four multipliers, Fld1_0Ldly,
Fld1_1Ldly, Fld1_2Ldly, and Fld1_3Ldly the data for animations which are performed
by the convolution operation with four data and are interpolated -- Sub_Data_Mov **
-- if expressed, it will calculate as follows.

[0063]

[Equation 2]

Sub_Data_Mov = Fld1_3Ldly * h(1.5)+Fld1_2Ldly * h(0.5)+Fld1_1Ldly *
h(-0.5)+Fld1_0Ldly * h(-1.5) [0064]

Although the notation which shows data also by this formula shows the information on
Rhine, it is equivalent to the pixel operation in Rhine.
Moreover, this operation is calculated in all Rhine that should be interpolated.

[0065]

(C) motion detection (steps ST6 and ST7 of
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000005"
TARGET="tjitemdrw">drawing 3</A>
) -- detect by moving to a degree.
Motion detection is a thing which changes interpolation processing in the part which
is standing it still to the part currently moved as an image as mentioned above and
to perform for accumulating.
About the technique of motion detection, the variation of the magnitude (intensity
level) of a signal is used for the criteria of a judgment with this operation
gestalt.
Temporarily, when the body is moving into the image, as shown in
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000010"
TARGET="tjitemdrw">drawing 8</A>
, difference is taken in the combination (the odd number fields and the even number
fields) of the things with the same location of the scanning line.
Suppose that the motion was detected, if the absolute value of the component of the
difference is higher than a certain threshold.
In the example of
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000010"
TARGET="tjitemdrw">drawing 8</A>
, the part which attached the continuous line is judged to be an animation, and a
white part serves as still picture decision.

[0066]

this operation gestalt -- the difference of the fields -- an operation is performed
4 times based on physical relationship as shown in
<A
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l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000011"
TARGET="tjitemdrw">drawing 9</A>

what added after diff the amount of delay of the field calculated, respectively --
difference -- as it considers as the absolute value of a component and is shown in
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000011"
TARGET="tjitemdrw">drawing 9</A>
, it is written as diff02, diff26, diff06, and diff13.
Furthermore, as the number of delay which shows the location of Rhine for what
showed the positional information of Rhine after an underbar is applied and it is
shown in
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000012"
TARGET="tjitemdrw">drawing 10</A>
, it is diff02_1Ldly. It writes like:
next, such difference -- since the mark is attached only to the larger signal
component than a certain threshold of the component, a flag is set up for every
pixel.
this time -- each difference -- the flag to a component -- difference -- after a
component -- an underbar and flg when it ties and writes, it is shown in
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000012"
TARGET="tjitemdrw">drawing 10</A>
-- as -- diff02_1Ldly_flg It becomes like.
these flags -- difference -- when a component is larger than a threshold, 1 is
given, and in being smaller than a threshold, it gives zero (0).
The value of this flag is used as an index of the difference which creates the final
output in processing (D).
That is, if a flag is 1, it will mean that the motion was detected by this pixel.

[0067]

If the threshold which serves as criteria of decision here is too small, it will be
influenced of a noise, and if too large, the fall of detection sensitivity will be
caused.
As for a threshold, in this operation gestalt, it is desirable as an index to set up
between 5% and about 10% to the maximum (if it to be 8 bits 255) of the whole
absolute signal level.
However, since the part for which it depends on hardware to a noise etc. is large,
it is necessary to give redundancy enough about a threshold.

[0068]

(D) Use for a decision criterion the motion signal flag detected by the creation
(steps ST8-ST11 of
<A
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%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000005"
TARGET="tjitemdrw">drawing 3</A>
) above-mentioned processing (C) of output data, and create a final output.
As the Rhine location which should carry out interpolation is described to be
Sub_Data and
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000006"
TARGET="tjitemdrw">drawing 4</A>
has shown it now, it is Fld1_1Ldly. Fld1_2Ldly Suppose that it is located between
Rhine.
<A

HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000013"
TARGET="tjitemdrw">Drawing 11</A>
is drawing showing the vertical-position relation of the flag which was obtained by
the processing at this time (C), and which moves and shows a detecting element.
The flag which summarized information to the ** [which was obtained by processing
(C)] sake which moves and makes the detection mistake of information lost motion
further here is created for every Rhine.
It is DiffOR_1Ldly_flg about the flag of Rhine corresponding to Rhine to
interpolate. As it carries out and is shown in
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000013"
TARGET="tjitemdrw">drawing 11</A>
, it is Rhine before and behind that DiffOR_0Ldly_fly and DiffOR_2 Ldly_fig It
carried out.
These flags should carry out OR (OR) operation of all of the motion detection flag
in two lines of the upper and lower sides with this Rhine and Diff13 nearest to [
Diff02, Diff26, and Diff06] the Rhine.
That is, the thing which was surrounded by the dotted-line arrow head among
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000013"
TARGET="tjitemdrw">drawing 11</A>
and which moved and took the OR (OR) of five flags of detection flag
Diff02_1Ldly_flg, Diff26_1Ldly_flg, Diff06_1Ldly_flg and Diff13_1Ldly_flg, and
Diff13_2Ldly_flg ** is DiffOR_1Ldly_flg. It becomes.
Here the flag which calculated these ORs is named generically, and it is DiffOR_flg.
It describes.
Moreover, the operation which takes these ORs is calculated similarly in each Rhine
location.
That is, DiffOR_0Ldly_flg and DiffOR_2Ldly_flg It becomes the same operation in the
location shifted one line, respectively.
These DiffOR_flg It is as follows when a group is expressed with operation
expression ("|" expresses an OR-operation child).

[0069]

[Equation 3]

DiffOR_0Ldly_flg = Diff02_0Ldly_flg |Diff26_0Ldly_flg
|Diff06_0Ldly_flg | Diff13_0Ldly_flg |Diff13_1Ldly_flg
[0070]

[Equation 4]

DiffOR_1Ldly_flg = Diff02_1Ldly_flg |Diff26_1Ldly_flg
|Diff06_1Ldly_flg |Diff13_1Ldly_flg |Diff13_2Ldly_flg
[0071]

[Equation 5]

DiffOR_2Ldly_flg = Diff02_2Ldly_flg |Diff26_2Ldly_flg
|Diff06_2Ldly_flg |Diff13_2Ldly_flg |Diff13_3Ldly_flg
[0072]

Also in these formulas, although the notation which shows data shows the information
on Rhine, it is equivalent to each pixel operation in Rhine.
Moreover, this operation is calculated in all Rhine that should be interpolated.

[0073]

Furthermore, these DiffOR_flg DiffOR_flg in nine points which include a target interpolation pixel and 8 target pixels of perimeters as it receives and is shown in

```
<A
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l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000014"
TARGET="tjitemdrw">drawing 12</A>
```
Mix_Sum used as the sum It calculates.
Mix_Sum DiffOR_flg which is equivalent to the surrounding location of eight points to the target interpolation pixel It uses and calculates like a degree type.

[0074]

[Equation 6]

Mix_Sum = L1+C1+R1+2 * (L2+C2+R2)+L3+C3+R3[0075]

Here, it is DiffOR_flg around [eight] a interpolation pixel as shown in L1, C1, R1, L2, C2, R2, L3, C3, R3, and
```
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000014"
TARGET="tjitemdrw">****12</A>
```
. It expresses.
Then, although
```
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000014"
TARGET="tjitemdrw">drawing 12</A>
```
shows the example in the case of interpolating the pixel of 14 trains of e lines, it is Mix_Sum of this pixel. It is set to 5.

[0076]

To the last, it is this Mix_Sum. Final output interpolation data are calculated using a numeric value.
At this operation gestalt, it is this Mix_Sum. Interpolation data Sub_Data_Stl for still pictures calculated by processing (A) according to the value Interpolation data Sub_Data_Mov for animations calculated by processing (B) It mixes (mix).
It is Mix_Sum in operation. It is Mix_Sum so that it may be set to 8 at the maximum although maximum may become to 12 since Rhine which consists of addition of the flag of nine points including the pixel and 8 pixels of perimeters which should be interpolated, and has a interpolation pixel is doubled two. Clipping of the value is carried out.
Specifically, all of eight or more numeric values are set to 8.
Mix_Sum clipped after that A value (referred to as Mix_Sum_clip), and interpolation data Sub_Data_Mov for animations That by which it multiplied, the value which lengthened the Mix_Sum_clip value from 8, and interpolation data Sub_Data_Stl for still pictures Although multiplied, the sum is taken, and what was finally divided by 8 serves as final interpolation pixel data.
This operation is expressed with a degree type when final interpolation data are set to Sub_Data.

[0077]

[Equation 7]

Sub_Data = (Mix_Sum_clip * Sub_Data_Mov+(8-Mix_Sum_clip) * Sub_Data_Stl) / 8[0078]

The output of the progressive signal finally outputted is Fld1_1Ldly as shown in
```
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
```

%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000006"
TARGET="tjitemdrw">drawing 4</A>
. Data and Fld1_2Ldly It realizes with outputting one by one to timing which puts Sub_Data calculated above on Rhine between data.

[0079]

Moreover, a progressive-ized signal is acquired by performing the same math operation as the above by physical relationship, as degree the field is also shown in
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000015"
TARGET="tjitemdrw">drawing 13</A>

In
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000015"
TARGET="tjitemdrw">drawing 13</A>
, the part enclosed with the frame of a continuous line is the data constellation used at the time of degree the field.
It becomes the same contents of an operation irrespective of the odd number field and the even number field in math operation.

[0080]

In addition, although the flow chart of
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000005"
TARGET="tjitemdrw">drawing 3</A>
which shows processing from the above (A) to (D) showed the procedure to (A), (B), (C), and sequence, there is no functionality in the sequence of these operations in fact at each.
Therefore, the sequence which carries out the operation in each processing of these (A), (B), and (C) may be replaced, and may be processed to juxtaposition.
Moreover, although the output of real Rhine data was brought to the head (step ST 1) with the flow chart, a location may be replaced as long as it fulfills the conditions which the output of the data of interpolation Rhine becomes by turns.

[0081]

gestalt>> besides << -- it mentioned above -- as -- a motion detecting element -- the field -- difference -- although that part was moved and it has judged with the part when a threshold is set up to a component and there is difference more than a threshold, it depends for the precision of a motion judging on this threshold greatly.
Although the sensibility of motion detection can be raised if a value with this small threshold is taken, the case where incorrect detection is carried out to a noise increases.
A setup of the best threshold is taking the smallest value in the range which is not incorrect-judged to be an animation by the noise in a still picture.
Then, it is desirable to make the value of a threshold as small as possible.
The optimum value by the signal class inputted is selected now here.

[0082]

As shown at
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000003"
TARGET="tjitemdrw">drawing 1</A>

in the case of a composite signal, it is changed into the signal of RGB through circuits, such as the Y/C separation circuit 11 and the color (chroma) decoder 12, and in color-difference-signal Y/R-Y/B-Y, it is changed through the chroma decoder 12 at RGB.
Moreover, when RGB is inputted, as shown in
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000003"
TARGET="tjitemdrw">drawing 1</A>
, it remains as it is and can treat as an RGB code.
That is, the magnitude of the noise component included when it is decoded by the signal inputted, respectively by the passing capacity situation of a path or a decoder at RGB changes.
Then, a fixed threshold is not given, but it is giving the optimal threshold for every signal class inputted, and the suitable motion judging which suited the signal class can always be performed.

[0083]

Furthermore, since the component (carrier leak) which was never able to negate the subcarrier to the Green signal G enters in case it decodes when a composite signal is inputted, a noise level becomes high from other blue signals B and red signals R. This point can be considered and the threshold optimized further can be given by setting up only Green more highly [threshold] than blue and red.

[0084]

Next, actuation of the image processing system of
<A
HREF="http://www4.ipdl.inpit.go.jp/cgi-bin/tran_web_cgi_ejje?u=http%3A%2F%2Fwww4.ipd
l.inpit.go.jp%2FTokujitu%2Ftjitemdrw.ipdl%3FN0000%3D237%26N0500%3D1E%5FN%2F%3B%3E%3B
%3E7%3A6%3C%3C%2F%2F%2F%26N0001%3D607%26N0552%3D9%26N0553%3D000003"
TARGET="tjitemdrw">drawing 1</A>
is explained.
For example, the composite video signal which is an interlace signal is changed into YC signal by the Y/C separation circuit 11, and is changed into the red signal R, the Green signal G, and the blue signal B by the chroma decoder of the further 1602 sections.
Moreover, in the case of the component signal of Y/R-Y/B-Y, it is similarly changed into the red signal R, the Green signal G, and the blue signal B by the chroma decoder 12.
And or it was changed, the red signal R from the outside is outputted to A/D-conversion circuit 13R, the Green signal G is outputted to A/D-conversion circuit 13G, and the blue signal B is outputted to A/D-conversion circuit 13B.

[0085]

In A/D-conversion circuit 13R, the red signal R which is the chroma decoder 12 or an analog signal from the outside is changed into a digital signal, and is outputted to field memory group 14R and IP conversion circuit 15R.
Similarly, in A/D-conversion circuit 13G, the Green signal G which is the chroma decoder 12 or an analog signal from the outside is changed into a digital signal, and is outputted to field memory group 14G and IP conversion circuit 15G.
In A/D-conversion circuit 13B, the blue signal B which is the chroma decoder 12 or an analog signal from the outside is changed into a digital signal, and is outputted to field memory group 14B and IP conversion circuit 15B.

[0086]

In field memory group 14R, the signal of 1 field delay benefits from field memory 14R-1, the signal of 2 field delay is acquired by field memory 14R-2, the signal of 3 field delay is acquired by field memory 14R-3, and the signal of 6 field delay can be acquired field memory 14R-6.
And the signal of these 1 field delay, 2 field delay, 3 field delay, and 6 field delay is supplied to IP conversion circuit 15R.

[0087]

In field memory group 14G, the signal of 1 field delay is acquired by field memory 14G-1, the signal of 2 field delay is acquired by field memory 14G-2, the signal of 3 field delay is acquired by field memory 14G-3, and the signal of 6 field delay is acquired field memory 14G-6.
And the signal of these 1 field delay, 2 field delay, 3 field delay, and 6 field delay is supplied to IP conversion circuit 15G.

[0088]

Moreover, in field memory group 14B, the signal of 1 field delay is acquired by field memory 14B-1, the signal of 2 field delay is acquired by field memory 14B-2, the signal of 3 field delay is acquired by field memory 14B-3, and the signal of 6 field delay is acquired field memory 14B-6.
And the signal of these 1 field delay, 2 field delay, 3 field delay, and 6 field delay is supplied to IP conversion circuit 15B, and it is ****.

[0089]

in IP conversion circuit 15R, the data for the all 5 fields of the present field signal by which a direct input is carried out from A/D-conversion circuit 13R, 1 field delay supplied from field memory group 13R, 2 field delay, 3 field delay, and 6 field delay use -- having -- the data between each field -- difference calculates.
and each data -- difference -- a flag is set into a larger part than a threshold with a value, the OR of each obtained flag data is searched for, and it is used for motion partial detection, and based on this detection result, the inputted interlace signal is changed into a progressive signal, and is outputted to D/A conversion circuit 16R.

[0090]

the present field signal by which a direct input is carried out from A/D-conversion circuit 13G in IP conversion circuit 15G, and the data for the all 5 fields of 1 field delay supplied from field memory group 13G, 2 field delay, 3 field delay, and 6 field delay -- business -- **** -- the data between each field -- difference calculates.
and each data -- difference -- a flag is set into a larger part than a threshold with a value, the OR of each obtained flag data is searched for, and it is used for ** and motion partial detection, and based on this detection result, the inputted interlace signal is changed into a progressive signal, and is outputted to D/A conversion circuit 16G.

[0091]

moreover, the data for the all 5 fields of the present field signal by which a direct input is carried out from A/D-conversion circuit 13B in IP conversion circuit 15B, and 1 field delay supplied from field memory group 13B, 2 field delay, 3 field delay and 6 field delay -- business -- **** -- the data between each field -- difference calculates.
and each data -- difference -- a flag is set into a larger part than a threshold with a value, the OR of each obtained flag data is searched for, and it is used for motion partial detection, and based on this detection result, the inputted interlace signal is changed into a progressive signal, and is outputted to D/A conversion circuit 16B.

[0092]

And in D/A conversion circuit 16R, the digital-progressive signal R outputted from IP conversion circuit 15R is changed and outputted to an analog signal.
Similarly, in D/A conversion circuit 16G, the digital-progressive signal G outputted from IP conversion circuit 15G is changed and outputted to an analog signal.
In D/A conversion circuit 16B, the digital-progressive signal B outputted from IP conversion circuit 15B is changed and outputted to an analog signal.

[0093]

according to [as explained above] this operation gestalt -- the former -- lost-motion detection, such as constraint of memory, -- one difference -- having computed only from the component -- receiving -- two or more field data -- using --

two or more difference -- since it amends in the form where they compensate a detection mistake mutually using data (difference component) and the data of a motion obtain, the motion detection with a sufficient precision with few mistakes can perform, and improvement in motion detection precision can aim at.

Although sensibility can be raised by lowering the threshold of motion detection simply and the mistake of motion detection can naturally be lessened about motion detection therefore, the failure by the noise will also increase.

However, without lowering a threshold in this case, a motion can be more correctly detected by using two or more motion detection data, and the effectiveness of the improvement in sensibility is acquired.

the field where a time interval is different in the detection mistake produced according to the problem that it is undetectable since the motion is too late conversely, the problem on which a motion is too quick to detect a motion only by each inter-frame difference especially, and etc. -- a detection mistake is suppliable with using two or more difference.

Specifically on the scene that an electric car enters and stops at the home of a station as a dynamic image etc., the electric car surely includes even the late motion from the quick motion.

In such a case, when a motion is detected only of a fixed time difference component, there are many detection mistakes, but if it detects from various time difference components, it can respond also to change of a rate and a detection mistake can be lessened.

[0094]

Moreover, by taking the difference of not only the difference of the even number fields but the odd number fields, it moves in the still finer range and detection is possible.

Since Rhine in the odd number field comes to the middle location of Rhine in the even number field, and Rhine, the motion detection component also turns into a component between Rhine of the even number field, and this leads to improvement in the motion ability to detect in the fine range.

[0095]

Moreover, since it was the method of an alternative of whether it moves by the phase which finally outputs interpolation data, and the interpolation data for still pictures are conventionally outputted by detection in it, or to output the interpolation data for animations, when the mode changed on the boundary of a still picture and an animation, change of the resolution by change was noticeable in the part, and image quality degradation had been caused.

On the other hand, change of the resolution in a change part can make it hard to be conspicuous, since the pixel which is moving by this operation gestalt in nine points including the perimeter pixel to the pixel to interpolate is looked for and it was made to change to a cine mode from still picture mode with the number of the pixels.

[0096]

Moreover, when asking for the sum of the motion detection flag in nine points, the sum of nine points can set only Rhine near the pixel to interpolate a maximum of to 12 not by 1 but by doubling two and adding 2.

A perfect cine mode and a mean value can make it easy to become a cine mode from a mix simple by taking ** full quiescence mode and the value of a still picture and an animation by which it is mixed on a linearity phase target by clipping this sum by 8, if it is zero, and it becomes eight.

This has few breakdowns of an image when the way which processed by judging a still picture as an animation sees rather than judging an animation to be a still picture and processing it in the case of incorrect detection, and has the effectiveness which cannot cause easily the decision mistake in which it is easy to be conspicuous in image quality.

[0097]

[Effect of the Invention]

As explained above, according to this invention, effectiveness as taken below can be

Page 26

acquired.

[0098]

(1): two or more field data -- using -- two or more difference -- motion detection with a sufficient precision with few mistakes can be performed by obtaining the data of data lost motion.

[0099]

(2): the field where two or more time intervals are different -- difference -- by using data, it can respond and detect also about a motion of various rates in a screen.

[0100]

(3): the difference of not only the difference of the even number fields but the odd number fields -- detection sensitivity can be raised by using data also to a motion of the fine range for scanning-line Mabe.
Moreover, it is also the same as when the relation of the field is reverse.

[0101]

(4): By moving and using the OR of the flag which shows a motion of (3) from the above (1) for a judgment, motion detection with the sufficient effectiveness from [from the above (1)] (3) and precision with few mistakes can be performed, it can respond and detect also about a motion of various rates in a screen, and the effectiveness that detection sensitivity can be raised also to a motion of the fine range for scanning-line Mabe can be acquired collectively.

[0102]

(5): Optimal motion detection can be performed to noise resistance by changing the threshold used by animation detection according to the path along which an input signal passes.

[0103]

(6): each motion detection to an RGB code -- each RGB -- more nearly optimal motion detection can be performed by giving the threshold according to individual.

[0104]

(7): By making into the ratio of an animation and a still picture the sum of the flag which shows the motions of two or more (for example, 9) points including a interpolation pixel and two or more (for example, 8) pixels of the perimeter, whenever [mix / of data] can be changed automatically.

[0105]

(8): By clipping the sum of the flag of two or more (9) points, the rate of an animation increases and use of the still picture data at the time of the animation which incorrect detection tends to expose can be prevented.

<HR>DESCRIPTION OF DRAWINGS
<HR>[Brief Description of the Drawings]

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TARGET="tjitemdrw">[Drawing 1]</A>

It is the block diagram showing 1 operation gestalt of the image processing system concerning this invention.

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TARGET="tjitemdrw">[Drawing 2]</A>

In this operation gestalt, it is drawing for explaining the field data used when performing IP transform processing.

<A
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TARGET="tjitemdrw">[Drawing 3]</A>

It is the flow chart which shows the procedure of the interpolation pixel creation concerning this operation gestalt, and progressive-izing.

<A
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TARGET="tjitemdrw">[Drawing 4]</A>

In this operation gestalt, when creating the interpolation data for still pictures, it is drawing for explaining the data to be used.

<A
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TARGET="tjitemdrw">[Drawing 5]</A>

In this operation gestalt, it is drawing showing the example in the case of using the average value of data as the interpolation data for still pictures from the field of correspond order in the pixel of Rhine which should be interpolated.

<A
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TARGET="tjitemdrw">[Drawing 6]</A>

Cubic used for interpolation It is drawing for explaining a function.

<A
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TARGET="tjitemdrw">[Drawing 7]</A>

Cubic It is drawing showing the example of the Rhine interpolation at the time of the animation by the function.

<A
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TARGET="tjitemdrw">[Drawing 8]</A>

It is drawing showing the example of the motion detection in the case of moving to the upper right from the screen lower left.

<A
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TARGET="tjitemdrw">[Drawing 9]</A>

the difference used for the motion detection concerning this operation gestalt -- it is drawing for explaining data.

<A
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TARGET="tjitemdrw">[Drawing 10]</A>

It is drawing for explaining the physical relationship of the motion detection flag concerning this operation gestalt.

<A
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TARGET="tjitemdrw">[Drawing 11]</A>

the field for the motion detection concerning this operation gestalt -- difference
-- it is drawing for moving with a component and explaining the relation of a flag.

<A
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TARGET="tjitemdrw">[Drawing 12]</A>

The image and Mix on the image of the Diff OR flag concerning this operation gestalt
    Sum It is drawing for explaining relation.

<A
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TARGET="tjitemdrw">[Drawing 13]</A>

degree the field -- it is drawing for explaining the following interpolation
physical relationship.

<A
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TARGET="tjitemdrw">[Drawing 14]</A>

It is drawing for explaining an interlace (jump) scan.

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TARGET="tjitemdrw">[Drawing 15]</A>

It is drawing for explaining a non-interlaced (one by one) scan.

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TARGET="tjitemdrw">[Drawing 16]</A>

It is drawing for explaining the example of creation of the interpolation data for
still pictures in general IP transform processing (inter-frame interpolation).

<A
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TARGET="tjitemdrw">[Drawing 17]</A>

It is drawing for explaining the example of creation of the interpolation data for
animations in general IP transform processing (interpolation between the fields).

[Description of Notations]

10 [-- An analogue-to-digital (A/D) conversion circuit, 14R, 14G and 14B, a
field memory group, 15R and 15G, 15 B--IP conversion circuit, 16R, 16G, 16B / --
Digital analog (D/A) conversion circuit.] -- An image processing system, 11 -- A
Y/C separation circuit, 12 -- A chroma decoder, 13R, 13G, 13B

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